

BASIS FOR THE AMENDMENT

Claims 11-16 have been added.

New Claims 11-16 are supported by original Claims 1-10 and page 5 of the specification.

No new matter is believed to have been added by the present amendment.

REMARKS

Claims 1-16 are pending in the present application.

The rejection of Claims 1-10 under 35 U.S.C. §103 over Arai et al (USP 6,235,855) is traversed.

Arai et al disclose a transition metal compound that is useful as a catalyst in the production of an aromatic vinyl compound polymer or an aromatic vinyl compound-olefin copolymer (see Abstract). As the Examiner properly notes, the disclosure of Arai et al differs from the present invention in that “the copolymerization catalyst is formed of a transition metal compound with a metallocene skeleton having one crosslinking group formed exclusively of a carbon-carbon crosslinking skeleton, instead of two cross-linking groups” (paper number 5, page 3, lines 1-4).

The present invention is based, in part, on Applicants’ discovery that some bis-bridged transition metal compounds, in which at least one crosslinking group is of a carbon-carbon crosslinking skeleton, have a special significance in achieving a high activity in the copolymerization of an α -olefin and an aromatic vinyl compound. Such an advantageous result would not be obvious in view of the disclosure of Arai et al.

At column 5, line 61 to column 9, line 46, Arai et al disclose innumerable alternatives for Y, as well as thousands of conceivable compounds spanning hundreds of generic catalyst

classifications, including several bis-bridged transition metal compounds in which at least one crosslinking group is of a carbon-carbon crosslinking skeleton (col. 9, lines 21 et seq.) as the Examiner indicates (paper number 5, page 4, lines 1-3). However, Arai et al continually disclose that the preferred, or even required, catalytic compound to give rise to their desired result is a transition metal compound with a metallocene skeleton having *one* crosslinking group.

Moreover, Applicants point out that Arai et al only use mono-bridged transition metal compounds in their numerous examples, and that no bis-bridged transition metal compound is actually used therein. In addition, Arai et al do not disclose or suggest the specific significance of the presently claimed crosslinking structure (see Claims 1 and 2) for obtaining a high copolymerization activity.

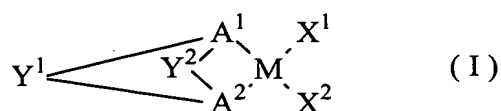
The insufficiency of the disclosure of Arai et al is demonstrated and underscored by the results of Examples 1-2 and Comparative Example 1 of the present specification, where ethylene and styrene are copolymerized under the same conditions except for the identity of the crosslinking groups employed in the transition metal compounds. In Examples 1 and 2, Applicants have shown that the copolymerization activity of the isopropylidene/dimethylsilylene-bridged compound is 101 kg/gZr/hr (page 40, line 1 to page 41, line 5) and 114 kg/gZr/hr (page 41, lines 6-13), respectively. In contrast, when the same experiment is repeated employing a catalyst compound that is consistent with the disclosure of Arai et al, a bis(dimethylsilylene)-bridged compound, the copolymerization activity is only 22 kg/gZr/hr. Therefore, based on the present invention, it is experimentally evident that the claimed crosslinking structure is critical in attaining a high copolymerization activity in the production of an α -olefin/aromatic vinyl compound copolymer. Applicants submit that these

superior results flowing from the present invention would not be obvious in view of the disclosure of Arai et al.

Applicants request withdrawal of this ground of rejection.

The rejection of Claims 1-10 under 35 U.S.C. §103 over JP 9-302014 is traversed.

JP 9-302014 discloses a process for producing an ethylene/aromatic vinyl compound by using a catalyst being a metallocene compound represented by formula I



wherein A1 and A2 are each (substituted) cyclopentadienyl or (substituted) indenyl; Y and Y' are each a (substituted) alkylene, a (substituted) silylene or a (substituted) germanylene; M is a group IV metal; X and X' are each H, a halogen, an alkyl, an alkoxy, an aryloxy or an amide, and a promoter comprising an organoaluminum compound [e.g. an aluminoxane represented by formula II or III, wherein R is a 1-5 C alkyl; and (m) and (n) are each 2-100] and/or a boron compound (see Abstract).

As the Examiner properly points out, the broad disclosure of JP 9-302014 does include, amongst an extensive list of suitable alternatives, a bis-bridged metallocene compound in which the crosslinking groups Y and Y' may be different, each being -CH₂CH₂-, -CH₂-, -CMe₂-, -CPh₂-, -CH₂CHPh-, -SiH₂-, -SiMe₂-, -SiPh₂-, -GeMe₂-, or -BMe₂-. However, JP 9-302014 only exemplifies a bis(dimethylsilylene)-bridged metallocene compound. In Table 1 of JP 9-302014, the bis(dimethylsilylene)-bridged metallocene compound has a polymerization activity, in the production of an ethylene/aromatic vinyl

compound copolymer, of 1.3×10^5 g/mol·hr. Conversion of this value to units consistent with the Examples of the present invention can be accomplished as follows:

$$1.3 \times 10^5 \text{ g/mol·hr} = 130 \text{ kg/91 gZr/hr} = 1.4 \text{ kg/gZr/hr (Zr = 91)}.$$

Therefore, it would appear that the polymerization activity of the bis(dimethylsilylene)-bridged compound of JP 9-302014 is far lower than that of the claimed bis-bridged compounds, as summarized above and demonstrated in the Examples (see pages 40-45). This distinction further underscores the criticality of the claimed bis-bridged structure in achieving a high copolymerization activity. Since JP 9-302014 fails to disclose or suggest the specific significance of the claimed bis-bridged structure, Applicants submit that the claimed invention is not obvious in view of JP 9-302014.

Withdrawal of this ground of rejection is respectfully requested.

The rejection of Claims 1-10 under 35 U.S.C. §103 over EP 0721954 is traversed.

EP 0721954 discloses a transition metal compound useful as a catalytic compound for olefin polymerization (see Abstract). According to EP 0721954, such a transition compound is used in the homopolymerization of an α -olefin and the copolymerization of an α -olefin with another α -olefin. However, at no point does EP 0721954 disclose or suggest employing their catalytic compound for the copolymerization of an α -olefin and an aromatic vinyl compound. Citing In re Royka, 490 F.2d 981, 180 USPQ 580 (CCPA 1974), MPEP §2143.03 states: "To establish a prima facie obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art." Applicants submit that the disclosure of EP 0721954 fails to meet this requirement, and as such the artisan would have no information regarding the specific significance of the claimed bis-bridged structure in attaining; a high polymerization activity in the production of an *α -olefin/aromatic vinyl*

compound copolymer. Accordingly, the present invention would not be obvious in view of EP 0721954.

The Examiner attempts to compensate for the fundamental deficiency in the disclosure of EP 0721954 by stating “it would have been obvious to utilize an aromatic vinyl compound as comonomer in this example in place of 1-octene because European generically teaches alpha-olefins having 3 to 8 carbon atoms as copolymerizable with ethylene” (see paper number 5, page 5, line 18 to page 6, line 1). When an Examiner maintains that there is an implicit teaching or suggestion in the prior art, “the Examiner should indicate where (page and line or figure) such a teaching or suggestion appears in the prior art.” (*Ex parte Jones*, 62 USPQ2d 1206, 1208 (Bd. Pat. App. & Inter. 2001). However, the Examiner has failed to provide a reason, explanation, or specific citation to motivate the artisan to use a aromatic vinyl comonomer as the Examiner has alleged. Therefore, the Office has not met the burden necessary to establish a *prima facie* case of obviousness.

Applicants request withdrawal of this ground of rejection.

Applicants further submit that, for all the foregoing reasons, new Claims 11-16 are not anticipated by or obvious in view of the art of record. Entry and favorable consideration of these newly presented claims are respectfully requested.

Applicants submit that the present application is now in condition for allowance.

Early notification of such action is earnestly solicited.

Respectfully submitted,

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IN THE CLAIMS

--Claims 11-16 (New).--